DOCUMENT RESUME

ED 213 530 PS 012 741

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TITLE Temperament Differences Between Infants Who Do and Do Not Complete Laboratory Testing.
PUB DATE [81]
NOTE 15p.; Paper presented at the Meeting of the Southwestern Psychological Association (Dallas, TX, April 15-17, 1982).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Individual Differences; *Infants; Parent Attitudes; *Personality; Physical Activity Level; Questionnaires; Test Validity; *Visual Perception; Withdrawal (Psychology)
IDENTIFIERS *Habituation

ABSTRACT

The purpose of the present study was to determine whether temperament differences exist between infants who completed a visual perceptual/cognitive experiment and those who did not. A total of 14 Caucasian infants ranging in age from 5-15 months participated in the study. The subjects were placed in one of two groups (completers vs. noncompleters) based upon their performance at four months of age in a visual habituation experiment. Infants were classified as noncompleters if they had fussed, cried or fallen asleep two or more times during the test session and could not be coaxed into a more attentive state (i.e., to be visually alert, motorically inactive). Additional information on the infants' behavior patterns was obtained from their mothers who were asked to complete the Infant Temperament Questionnaire Revised (ITQR). Based upon personal observation and parental comments from previous investigations it was predicted that the subjects in the completers group would tend to be classified as easy or intermediate in temperament whereas the noncompleters group would generally be labeled as difficult or slow to warm up. In general, results supported this prediction. In comparison to the completers, the noncompleters were found to be more motorically active, withdrawing, and negative in mood. The findings were discussed in terms of the questionable external validity of most infant perceptual/cognitive investigations. (Author/MP)

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Temperament Differences Between Infants Who Do and Do Not Complete Laboratory Testing

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Running Head: Temperament Differences

Abstract

Temperament differences were examined in a group of infants classified as completers and noncompleters based upon their perfomance in a visual habituation study. Using the Infant Temperament Questionnaire Revised the completers were generally classified as "easy" while the noncompleters were often classified as "difficult" babies. The noncompleters in comparison to the completers were found to be more: motorically active, withdrawing, and negative in mood. The findings were discussed in terms of the questionable external validity of most infant perceptual/cognitive investigations.

Temperament Differences Between Infants Who Do and Do Not Complete Laboratory Testing

An assumption often made in infant perceptual/cognitive research is that there is a nonselective attrition rate among the participants. That is, researchers typically maintain that random state changes (e.g., sleeping, crying, extreme motor activity) account for those that fail to complete the session in the laboratory rather than more persistent individual differences. As Willemsen (1979) notes, however, the infant literature may be based primarily on data obtained on a specific type of baby -- the adaptable and alert infant with a long attention span whose parents are supportive of research. To date, however, no effort has been made to determine whether there are behavioral differences between those infants that complete laboratory testing versus those that do not.

Anecdotal comments by parents whose infants fail to finish testing lead one to believe that there may be individual differences that differentiate completers from noncompleters. For instance, parents whose babies drop out of the session frequently state that their infants do not adapt well to novel situations, exhibit extreme fear responses to strangers (e.g., cry, fuss, turn away) are not easily soothed once upset, and show irregular activity patterns at home (e.g., sleep, eat, play). On the other hand, parents of infants who do complete the testing generally state their children show opposite characteristics (e.g., highly adaptive, rhythmic activity patterns, easy soothability).

These anecdotal remarks concerning infants' responses to various situations describe behavioral characteristics that have been used in the assessment of infant temperament (Carey, 1970; Carey & McDevitt, 1978; Thomas, Chess, Birch, Hertzig & Korn, 1963). Briefly, temperament can be defined as the relatively enduring behavioral style of an individual across numerous conditions. Thomas, Chess, and their colleagues (Thomas & Chess, 1977; Thomas, Chess & Birch, 1968, 1970; Thomas, Chess, Birch, Hertzig & Korn, 1963) were among the first to assess

infant temperament from a behavioral perspective. That is, they were interested in infants' discrete, overt responses to numerous environmental situations (e.g., feeding, bathing, playing, sleeping). Through the administration of behavioral interviews (see Thomas & Chess, 1977) they derived nine characteristics of temperament: activity level, rhythmicity, approach, adaptability, threshold, intensity, attention span, distractibility, and persistence. These dimensions were subjected to further behavioral assessment over a ten-year span using such methods as teacher ratings, direct observation in school settings, and retrospective analysis of historical information (e.g., clinic records, hospital reports, school files). Their findings resulted in the classification of infants into three categories: easy (rhythmic, approaching, high adaptability, and mild intensity), difficult (opposite characteristics), and slow-to-warm-up (inactive, withdrawing, low adaptability, and mild intensity).

Since this early work of Thomas and Chess, several efforts have been made to develop behavioral rating forms for parents (Bates, Freeland, & Loundsbury, 1979; Carey, 1970; Carey & McDevitt, 1978; Rothbart, 1981; Scarr & Salapatek, 1970). One of the few standardized surveys that is used frequently in research is the Carey and McDevitt (1973; revised 1978) Infant Temperament Questionnaire.

This instrument consists of nine categories designed to measure the nine characteristics identified by Thomas and Chess as well as what Carey has termed "mood." This particular survey was chosen for comparing the two groups of infants in the present study for a number of reasons: (1) high test-retest reliability, (2) high internal consistency for the nine categories, and (3) availability of normative data.

The purpose of the present study was to determine whether temperament differences exist between infants who completed a visual perceptual/cognitive experiment and those who did not. Based upon personal observations and parental

comments from previous investigations it was predicted that the noncompleters generally would be classified as "difficult" or "slow-to-warm-up" while the completers more likely would be classified as "easy" or "intermediate."

Method

Participants

A total of 14 Caucasian infants ranging in age from 5-15 months participated in the study. All subjects were full term with no known abnormalities. The subjects were placed into one of two groups (completers vs. noncompleters) determined by their performance at four months of age in a visual habituation experiment (Treiber, Note 1). Infants were classified as noncompleters if they had fussed, cried or fell asleep two or more times during the test session and could not be coaxed into a more attentive state (i.e., visually alert, motorically inactive). In addition, subjects were matched with respects to sex, birth order, and age at the time of the temperament assessment. These criteria resulted in 7 completers (age range 5-15 months, $\underline{m}$ = 11.00 months; 4 males, 3 females) and 7 noncompleters (age range 5-15 months, $\underline{m}$ = 11.14 months; 4 males, 3 females).

Instrument

The survey used was the Carey Infant Temperament Questionnaire-Revised (ITQR) (Carey & McDevitt, 1978). It is comprised of 95 items that describe specific behaviors of the infant across numerous situations such as feeding, sleeping, playing, bathing, diapering, and reactions to strangers and novel situations, etc. Responses to the items are scored in the nine categories of temperament described by Thomas et al. (1963). The questionnaire was standardized on 203 4- to 8-month-old infants and has high internal consistency (range = .49 to .71, median = .57).

Procedure

Mothers were contacted by phone and asked to participate in a research project aimed at collecting normative data on middle-class infants' behavior patterns. This method was employed to control for any demand characteristics related to the infant's earlier performance in the laboratory. All parents who were contacted agreed to participate and received the ITQR in the mail along with a stamped return envelope. Ninety percent of the mothers to whom ITQRs were mailed participated in the study.

Results

The means and standard deviations for the nine categories are shown in Table 1 along with Carey and McDevitt's (1978) revised norms. The mean scores of the noncompleters group were more than one standard deviation above the norm on three measures: rhythmicity, approach, and distractibility. Carey and

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Insert Table 1 about here

McDevitt (1978) would characterize these infants as being arrhythmic in cyclic types of behavior (e.g., sleep, wake, hunger), showing general patterns of withdrawal to environmental demands, and not easily distracted from ongoing behavior (e.g., crying). The mean scores of the completion group did not fall above or below one standard deviation on any of the characteristics.

Each subject was classified according to Carey and McDevitt's (1978) procedure. These classifications were: easy, intermediate low, intermediate high, slow to warm up, and difficult. These classifications were ranked in increments of one with easy equalling a one and difficult being a five. The mean diagnostic classification score for the completion group was 2.29 compared to a mean score of 4.57 for the noncompletion group. These diagnostic classifi-

cation scores were subjected to a one-way analysis of variance which revealed a significant effect, $F(1,12) = 19.69$; $p < .0008$.

A predictive stepwise discriminant analysis was performed on the nine subscales of the ITQR. This was done to determine how useful the ITQR is in classifying infants into appropriate groups (i.e., completers *vs.* noncompleters). The results yielded a 100% correct *a posteriori* classification of subjects into groups.

Since this procedure is generally viewed as providing a liberal estimate of correct classification, a subsequent jacknifed classification procedure was performed which controls for the somewhat upward bias estimates. Table 2 shows the resulting classification matrix with the elements labeled as "misses"

Insert Table 2 about here

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denoting the number of incorrect classifications and the elements labeled as "hits" denoting the number of correct classifications. The noncompleters group was again perfectly predicted with 71.4% of the completers group being correctly classified, resulting in a total correct classification of 85.7%. This total percentage of correct classifications is greater than that expected from chance when compared to a random assignment of 50%, x^2 (1) = 4.14, $p < .05$.

Subsequent one-tailed *t* tests were performed on the nine temperament categories to determine which factors discriminated the two groups. Significant differences were found for three of the categories: activity, $t(12) = 1.79$, $p < .05$, and mood, $t(12) = 1.81$, $p < .05$, and approach, $t(12) = 1.78$, $p < .05$.

Discussion

The purpose of this research was to determine whether any temperament differences exist between infants who complete laboratory test sessions versus

those who do not. A prediction was made that the completers group subjects would tend to be classified as easy or intermediate in temperament whereas the noncompleters group members would generally be labeled as difficult or slow to warm up. The data supported this prediction.. A comparison of the present data to the norms of Carey and McDevitt (1978) norms on the nine temperament categories showed the noncompleters group to be quite arrhythmic, withdrawing, and nondistractible. All of these behaviors are characteristic of the difficult or slow-to-warm-up infant. Additionally, the diagnostic classification analysis revealed that infants in the noncompleters group generally fell into the difficult category while the completers group babies tended to be diagnosed as easy. Furthermore, compared to the completers group, the noncompleters group was found to exhibit a more negative mood, withdraw from novel situations more frequently, and show higher levels of general motor activity in their daily activities. Finally, the results of the predictive discriminant analyses indicate that the ITQR could be beneficial in predicting which infant would be more likely to complete testing under laboratory conditions.

From these findings it appears that infants' reactions in laboratory settings are characteristic of their behavior in their natural environment. For instance, those babies that fail to complete lab testing due to fussiness, crying and/or extreme motor activity demonstrate such behaviors across a variety of situations (e.g., approach of stranger, new foods, play, diaper change). This finding implies that infant researchers should not assume that attrition in laboratory settings is a result of unimportant random state changes. Rather, there seem to be enduring behavioral differences between these two groups of infants. These results pose an additional threat to the already questionable external validity of findings in the majority of infant perceptual/cognitive investigations. This is not to say that infants who fail to complete laboratory

testing necessarily differ from completers in perceptual/cognitive development, but this possibi.ity remains to be tested empirically.

Reference Note

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Table 1

Means and Standard Deviations for the Nine Temperament Categories

Temperament Category	Group					
	Completer		Noncompleter		Norm[a]	
	m	Standard Deviation	m	Standard Deviation	m	Standard Deviation
Activity	4.39	.34	4.79	.49	4.40	.56
Rhythmicity	2.77	.68	3.19	1.00	2.36	.68
Approach	2.61	.84	3.36	.72	2.27	.78
Adaptability	2.15	.70	2.55	.63	2.02	.59
Intensity	3.80	.59	3.73	.33	3.42	.71
Mood	2.67	.78	3.36	.65	2.81	.68
Persistence	3.36	.52	3.31	.76	3.03	.82
Distractibility	2.46	.65	2.90	.69	2.23	.60
Threshold	3.85	.56	3.80	.45	3.79	.76

a = scores 1 S.D. above norm represent difficult side of temperament

Table 2

Classification Matrix of Groups Based Upon

Jacknifed Discrimination Procedure

		Predicted Group Membership	
Actual Group	N	Completion	Noncompletion
Completion	7	5 71.4%	2 28.6%
Noncompletion	7	0 0%	7 100%

Hits Misses

% of grouped cases correctly classified = 85.7%